U.S. Department of Agriculture
Natural Resources Conservation Service

MT-ENG-2A
Rev. 12/02

IRRIGATION PLANNING WORKSHEET

Land user _____
Job description _____
Location _____
Planner _____ Date _____ Checked by _____ Date _____

SOIL DATA FOR CONTROLLING SOILS 1/

Soil Name	Percent of Area (approx.)	Cumulative Available Water Capacity					Depth to Restrictive Layer (ft)	Intake Family or Group 2/
		1 ft	2 ft	3 ft	4 ft	5 ft		

MAXIMUM TIME BETWEEN IRRIGATIONS USING ANY TYPE OF SYSTEM

Crop Alternative 3/	Management Root Zone 4/ (ft)	Total AWC 5/ (in)	Management Allowed Depletion 6/ (%MAD)	Max. Net Replacement (SWD @ MAD) 7/ (inches)	Peak Daily CU 8/ (in/day)	Maximum Irrigation Frequency at Peak CU (SWD @ MAD/CU) 9/ (days)

MINIMUM SYSTEM FLOW REQUIREMENTS FOR SPECIFIC SYSTEMS

Description of Alternative System Design 10/	Depth of Irrigation Application			Peak Daily Consumptive Use Based on Net Irr. (CU) 13/ (in/day)	Maximum Irrigation Frequency (IF) = Fn/CU 14/ (days)	Minimum System Flow Requirements		
	Net. Irr. Application (Fn) 11/ (inches)	Application Efficiency (E) 12/ (percent)	Gross Irrigation Application (Fg) = Fn/E x 100 (inches)			Total Flow (Q) 15/ (gpm)	(cfs)	gpm per acre

Minimum dependable flow available to system_____ gpm _____ cfs
Irrigated Area_____ Acres Total operating hours per day _____ hrs

1/ Enter data for the most prevalent soils that will occur in the field(s) to be irrigated. If there is not one predominant soil, a decision must be made as to which soil the irrigation system design and management will be based on. Soil data may be obtained from a published soil survey, Soil Interpretation Records, Irrigation Guide Appendix A, or by field investigation. Field checking is always desirable.

2/ Enter either sprinkler intake group, border intake family or furrow intake family for irrigation system. Get this from Irrigation Guide Appendix A, or a field investigation along with Table 2.1 in the Irrigation Guide.

3/ The irrigation system plan or design is usually based on the crop to be grown which has the highest peak consumptive use. That crop should be entered here. If you want to compare other crops, enter them. If more than one crop is to be grown at once under the system, complete Part B of this worksheet.

4/ Management root zone is the mature root depth to be managed. Consider both soil restrictions and crop characteristics in setting this depth. See Irrigation Guide Table 3.3. Field checking of root depth is frequently needed.

5/ Enter Available Water Capacity (AWC) for the selected management soil at the selected management root zone depth.

6/ Management Allowed Depletion (MAD) is the percentage of AWC that will be depleted at the point it becomes desirable to irrigate. See Irrigation Guide Tables 3.1 and 3.2.

7/ Maximum net replacement is the maximum, not necessarily the optimum, net replacement that a system should be designed for using any type of irrigation system. (SWD) is Soil Water Deficit.

8/ For a single crop, peak daily consumptive use (CU) may be obtained from Irrigation Guide Appendix C or a computer program run. For multiple crops planted under the system at one time, complete Section B of this worksheet.

9/ For full service irrigation, maximum irrigation frequency is the maximum time allowed between irrigations no matter what type of system is used to apply irrigation water.

10/ A short identifying description of the alternative system to be analyzed. For example "Low Pressure Pivot Alternative A."

11/ The net irrigation depth (F_n) to be applied during each set by this particular system alternative. For example it may be 1.0 inch per revolution for a pivot or 4.0 inches for a graded border system.

12/ Enter design application efficiency. Chapter 6 of the Montana Irrigation Manual, Montana Irrigation Guide, and National Irrigation Guide provide guidance. This is a judgement based on how efficiently you judge the system alternative can be operated and managed by the user. For sprinklers, be sure to consider wind effects on real application efficiency.

13/ Peak consumptive use (CU) varies by net application depth (F_n). Get CU from Appendix C of the Irrigation Guide or by a computer program run.

14/ Maximum frequency is the maximum time between irrigations for this particular irrigation system alternative during the period of peak consumptive use.

15/ $$Q_{gpm} = \frac{453 \times A \times F_g}{IF \times H} = \text{Required Minimum Alternative System Capacity}$$

A = Acres irrigated by this system alternative
F_g = Gross depth of irrigation application (inches)
IF = Irrigation Frequency (days between irrigations)
H = Total operating hours per day (deduct system change hours)

Note that this is minimum system capacity. The user may want additional capacity so the field may be irrigated in a shorter time.